

LA-UR-21-27976

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Title: RCT Continuing Training: 3rd Quarter 2021

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Intended for: Training

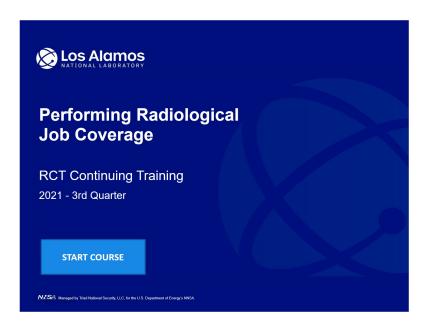
Issued: 2021-08-10



3rd Quarter Continuing Training - Job Coverage Final

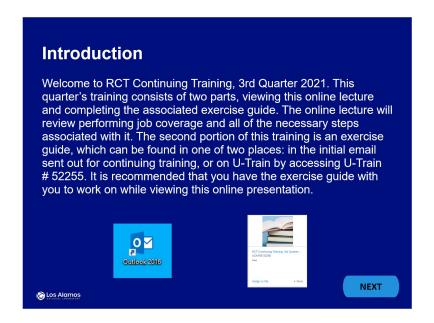
1. Job Coverage Lesson

1.1 2021 3rd Quarter Continuing Training



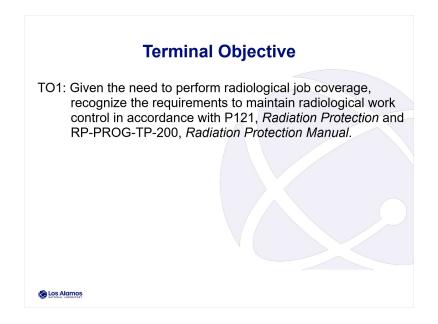
Notes:

1.2 Introduction



Notes:

1.3 Terminal Objective



1.4 Enabling Objectives

Enabling Objectives

EO1: Identify the components of an RWP brief

EO2: Explain how to implement work controls as required per the RWP

EO3: Identify the different methods used to monitor radiological work conditions

EO4: Identify the necessary documentation for job coverage

EO5: Explain the stop work/pause work processes

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1.5 Enabling Objectives Continued

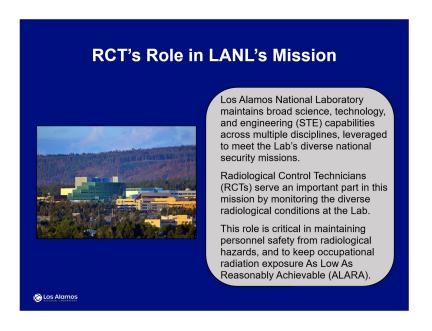
Enabling Objectives

EO6: Identify the reporting criteria to submit an RPIN

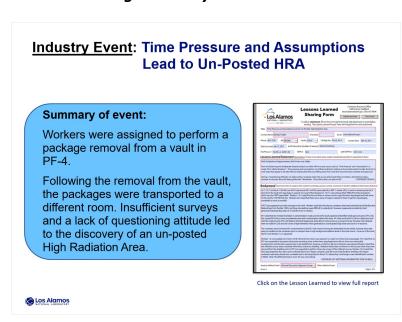
EO7: Explain the method of performing a whole-body frisk

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1.6 Role of an RCT



1.7 Job Coverage Industry Event



Notes:

1.8 Series of Events 1 of 3

Series of events:

- □ An RCT was assigned to cover a job removing packages from a vault in PF-4
- ☐ The old HPRMS tags on the items were no longer legible
- ☐ Initial package dose rates could not be taken in the vault due to high background levels
- Radiation dose on the packages were assumed not to be an issue due to the Pu-238 concentrations listed on the paperwork
- It was not identified the package also consisted of light elements which generated an unanticipated high dose rate due to α-n reactions





1.9 Series of Events 2 of 3

- ☐ Following the movement out of the vault, the workers and RCT separated.
- No RCT coverage was requested when the packages were opened due to previous survey history of similar items.
- A nearby Model 215 began to alarm.
- The workers notified an RCT and followup surveys with an RO-20 discovered 25 mR/hr.
- ☐ The RCT did not have an NRD available to check the packages.
- Contamination surveys found no detectable activity.





Notes:

1.10 Series of Events 3 of 3

- ☐ The RCT left the area and the items were relocated to another room.
- After the transfer, the workers requested another RCT to survey the packages for neutrons.
- ☐ The neutron survey discovered 375 mrem/hr at 30 cm, creating the discovery of an un-posted high radiation area.
- □ EPDs were not required to be used per the RWP. It was estimated that approximately 25 mrem was received due to the event.
- ☐ The room and nearby corridor were red-lit.



1.11 Industry Event- What Caused This?

Industry Event – What Caused This?

Contributing Factors

Lack of a questioning attitude

- Too many assumptions made
- Not performing correct surveys
- Insufficient job coverage
- Improper survey instrumentation
- Inadequate RWP requirements

Electronic dosimetry not used

How to Prevent

- Using a job specific RWP
- Conduct a formal RWP brief
- Implementation of work controls
- · Maintain continuous coverage
- Conduct pre-job, during work, and post-job surveys
- Reinforce ALARA practices

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1.12 Radiological Work Controls



Radiological evolutions conducted at LANL are reinforced with a hierarchy of controls which include the following:

- Elimination/Substitution (Decontamination, decay)
- Engineering controls (HEPA, shielding)
- Administration controls (RWP, FRPR)
- PPE (Respirator, PCs)

The role of the RCT is to ensure these controls are enforced and to provide radiological oversight to the workers.





1.13 Radiological Work Permits

Radiological Work Permits

A Radiological Work Permit (RWP) is a document used to identify radiological conditions, establish worker protection, monitoring requirements, and contains specific approvals for radiological work activities.

The RWP serves as an administrative process for planning and controlling radiological work and informing the worker of the conditions in the area.





1.14 RWP Usage

RWP Usage

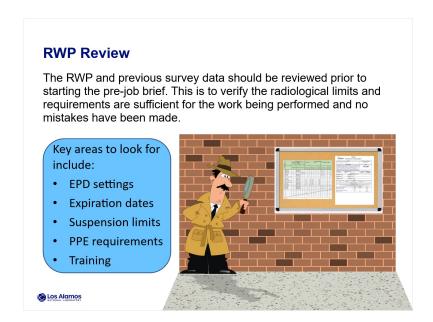
RP-PROG-TP-200, Section 1123.1

RWPs are required to be used for:

- High hazard radiological work as defined in P121 Table 11-4,
 Radiological Work Permit (RWP) and Integrated Work Document
 (IWD) Decision Requirements for Radiological Work
- Moderate hazard radiological work if the work is NOT covered by a Facility Radiation Protection Requirement (FRPR)
- Direct handling of radioactive material with an uncorrected contact instrument reading >50 mR/h (except DU), if the work hazards and controls are NOT specifically defined in a FRPR



1.15 RWP Review



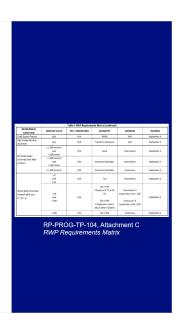
1.16 RWP Requirements Matrix

RWP Requirements Matrix

RWP limits are created around a set of matrices found in procedure RP-PROG-TP-104, Radiological Work Permit Process Using Sentinel.

These tables have pre-established requirements based on the radiological conditions of the job.

During their review, the RCT can reference these tables to their RWP. This questioning attitude can help discover potential issues before they are found after commencing the job.





1.17 RWP Copy Control

RWP Copy Control

In order to ensure multiple copies of an RWP are not being circulated and the correct revision is being used, a copy control procedure is in place.

RP-PROG-TP-104, Radiological Work Permit (RWP) Process Using Sentinel

RWP Copy Control

- 1. Control official RWP copies by performing the following:
 - Enter the FOD, RWP Authority Name and Z# at the top of RP-PROG-FORM-097, Radiological Work Permit (RWP)
 Check-Out Log to initiate a new log sheet for official copies
 - Stamp any printed official copies with "Official Copy #" where "#" is a unique number for each copy



1.18 RWP Copy Control Continued

RWP Copy Control

- Complete an RP-PROG-FORM-097, RWP Check-Out Log entry for each official copy by entering the RCT Name, RWP Work Location, RWP #, Official Copy #, RWP Expiration Date, and Check-Out Date
- IF an official copy is returned to the RWP Authority, then enter the date returned into the applicable RP-PROG-FORM-097 row
- IF an RWP is revised, then ensure all official copies of the old revision are collected and log the date returned for each copy on RP-PROG-FORM-097
- IF an RWP expires, then ensure all official copies of the expired RWP are collected and log the date returned for each copy on RP-PROG-FORM-097
- Shred any old RWP revisions or expired RWP copies



1.19 RWP Briefings

RWP Briefings

Workers, supervisors directly participating in the job, cognizant radiological control personnel, and representatives from involved support organizations should attend the prejob briefing.

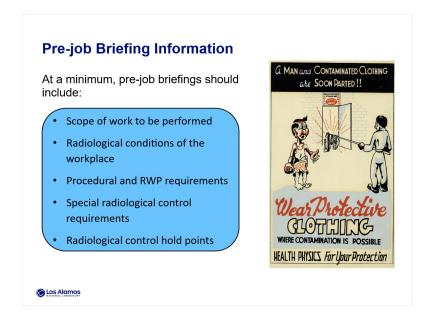
A briefing is required if an RWP exists without an IWD or the IWD brief does not adequately cover radiological hazards and controls.

The RWP will also state the required frequency for performing the briefs.

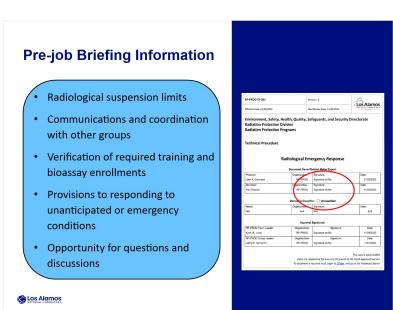


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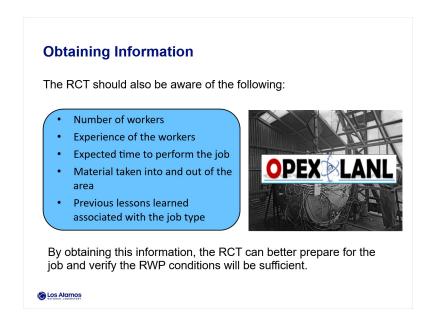
1.20 Pre-job Briefing Information



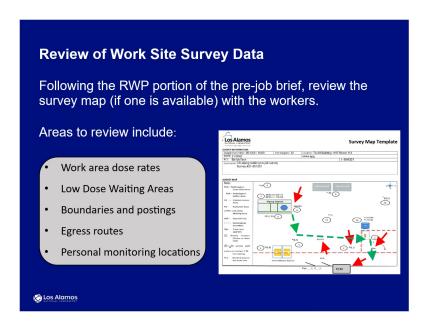
1.21 Pre-job Briefing Information Continued



1.22 Obtaining Information



1.23 Review of Work Site Survey Data



1.24 RWP Pre-Job Briefing Log

RWP Pre-Job Briefing Log

At the end of the brief, the RCT will answer any questions and confirm all requirements have been met. The prejob briefing log associated with the RWP will need to be signed by all personnel attending the brief, including RCTs.

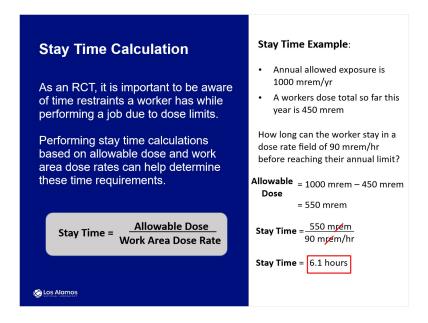
This log acts as a legal record stating the attendee has been briefed, understands, and will adhere to all hazards/controls/training defined by the RWP.

Verify the current revision and expiration date of the RWP being used.





1.25 Stay-time Calculation



1.26 RWP Field Changes

RWP Field Changes

RP-PROG-TP-104, Radiological Work Permit (RWP) Process Using Sentinel

RWP Field Changes

- Field changes should only be made for circumstances where RWP
 Authorities and approvers are not readily available to change and approve
 the RWP electronically (e.g., during shift work, weekend work, etc.).
- 2. All field changes shall be approved by an RP Manager who is also a trained and authorized RWP Approver.
- 3. IF the work is authorized by an IWD, THEN the PIC must approve all field changes to the RWP, in addition to the RP Manager.
- All approving individuals (including the supporting RCT) must agree that the proposed field changes are appropriate and no new hazard is introduced.



1.27 Field Change Exclusions

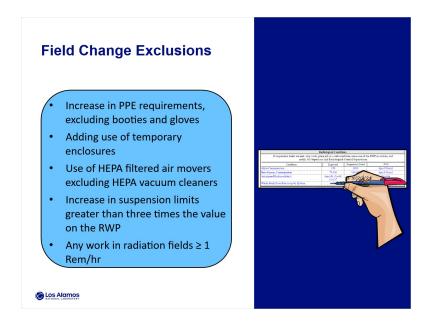
Field Change Exclusions

- 5. RWP field changes are not permitted for the following:
 - Change in work scope outside the work authorization document
- New hazard not initially identified during the hazard analysis
- Increase in EPD dose rate or dose alarm limits
- Increase in individual or collective dose limits
- Increase in respiratory protection requirements





1.28 Field Change Exclusions Continued



1.29 Documentation of Field Changes

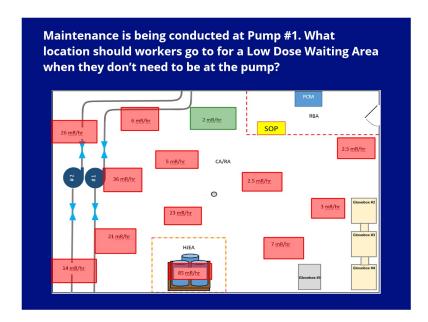
Documentation of Field Changes

- 6. Document the field change on the RWP by performing the following [a] Pen and ink the change(s) in appropriate sections of the RWP [b] Supporting RCT initials and dates the field change on the RWP [c] Obtain approval from RP Manager and PIC:
 - IF on-site and available, THEN the RP Manager and PIC initial and date the field change on the RWP.
 - IF the RP Manager or PIC are not available, THEN the supporting RCT will obtain verbal approval and write "per verbal conversation with *Name (Title)*" on the RWP for each missing individual.
- 7. Field changes must be electronically incorporated into the RWP and the RWP approved within one working day of the field change.



1.30 Knowledge Check #1

(Hotspot, 0 points, unlimited attempts permitted)

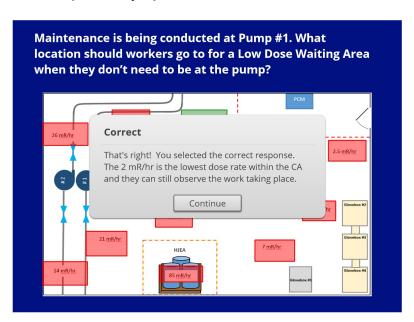


Feedback when correct:

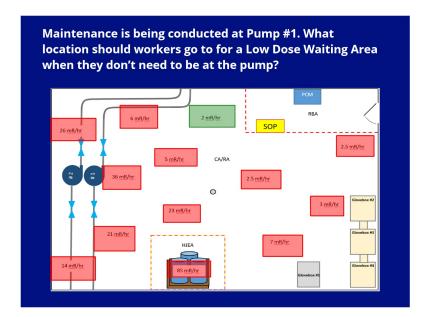
That's right! You selected the correct response.

The 2 mR/hr is the lowest dose rate within the CA and they can still observe the work taking place.

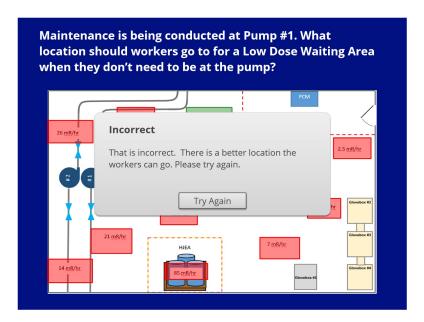
Correct (Slide Layer)



Incorrect (Slide Layer)

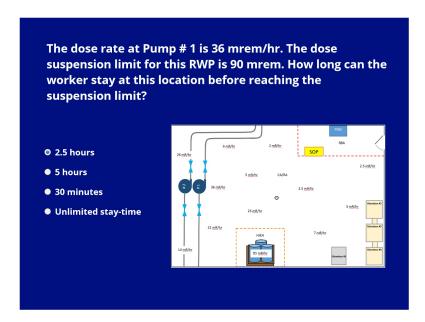


Try Again (Slide Layer)



1.31 Knowledge Check #2

(Multiple Choice, 0 points, unlimited attempts permitted)



Correct	Choice
Х	2.5 hours
	5 hours
	30 minutes
	Unlimited stay-time

Feedback when correct:

That's correct!

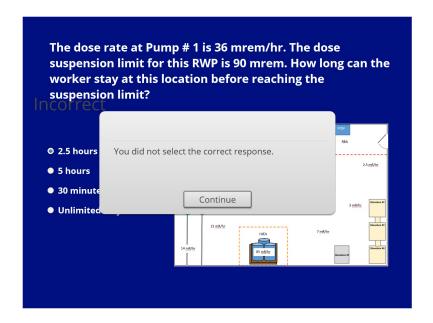
Stay time = Allowable dose / work area dose rate

90 mrem / 36 mrem/hr = 2.5 hours

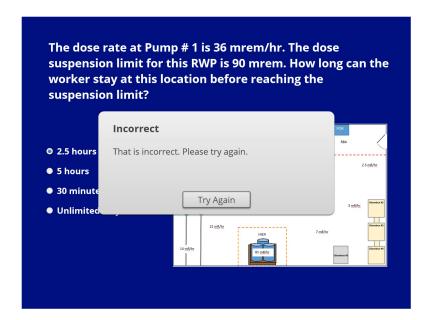
Feedback when incorrect:

You did not select the correct response.

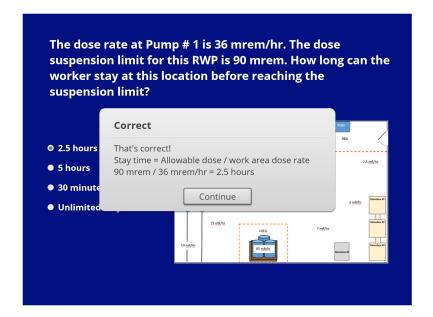
Incorrect (Slide Layer)



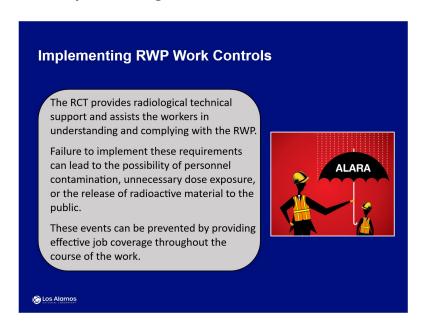
Try Again (Slide Layer)



Correct (Slide Layer)



1.32 Implementing RWP Work Controls



1.33 Types of Job Coverage

Types of Job Coverage

RCT job coverage requirements are based on a hazard assessment, found in P121, Radiation Protection, Ch. 11

The two types of job coverage are:

Intermittent: The RCT is required to be present at predetermined portions of the job that have a potential of changing the radiological conditions in the area.

Continuous: The RCT is required to be present at all times for the duration of the job. They will need to be in the vicinity of the job and able to communicate with the workers. This is to ensure they have the capability to stop work if needed.

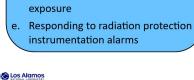
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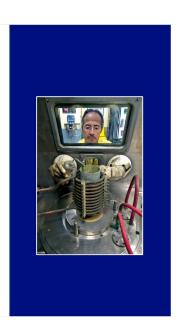
1.34 RCT Required Coverage

RCT Required Coverage

P121 requires an RCT must be present for the following activities:

- Receiving radioactive material shipments
- b. Initial opening of shipped containers of radioactive materials
- c. Breaching contaminated systems
- d. When respiratory protection is required to control radiological exposure



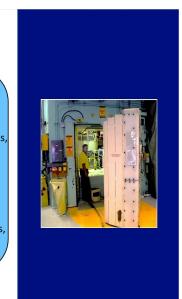


1.35 RCT Required Coverage Continued

RCT Required Coverage

- f. Surveying materials and equipment to be released from RCAs for contamination, CAs, HCAs, or ARAs;
- g. Entering and exiting CAs, HCAs, ARAs, HRAs and VHRAs
- h. Placing, removing, or modifying radiological posting;
- When an unusual or abnormal condition is discovered involving areas, materials, systems, containers, or devices posted or labeled for radiological hazards.





1.36 Failure to Implement Work Controls

Failure to Implement Work Controls

Even with administrative hazard controls in place, such as an RWP, industry events continue to occur. A contributing factor to these incidents is human performance errors.

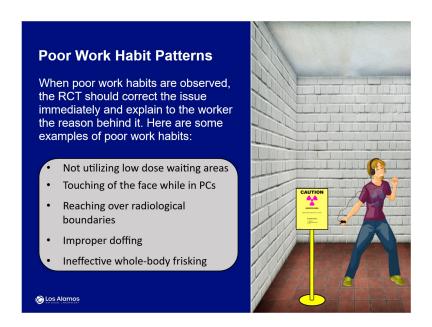
Precursors associated with these include:

- Poor work habit patterns
- Worker complacency
- · Lack of critical thinking
- Inadequate RWP briefing
- Insufficient peer-checking

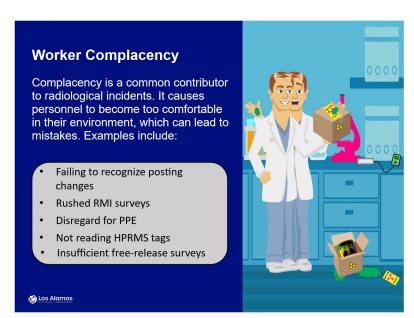


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1.37 Poor Work Habit Patterns



1.38 Worker Complacency



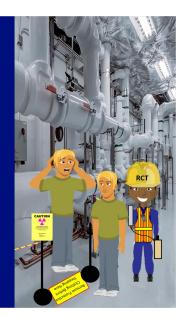
1.39 Lack of Critical Thinking



to be prepared for adverse situations. Ways an RCT can do this include:

- Ask the HPFC or senior RCTs for advice and their personal lessons learned for similar jobs
- Bring extra supplies (smears, bags, absorbents, etc.)
- Plan for any possible outcome
- Have another RCT assist with the job





1.40 Inadequate RWP Briefing

Inadequate RWP Briefing

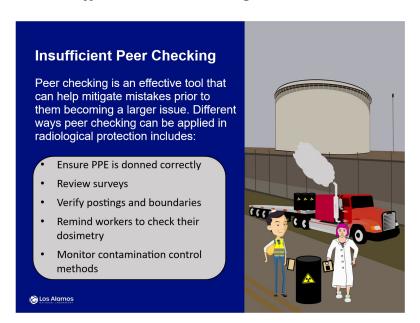
The RWP brief is a critical part in job coverage. This is where the RCT can verify the workers understand the radiological requirements. During the brief an RCT should:

- Be interactive with the attendees
- Point out any conditions that have changed since the last brief
- Discuss past lessons learned
- Verify all training and bioassay enrollments are up to date
- Confirm current RWP revision



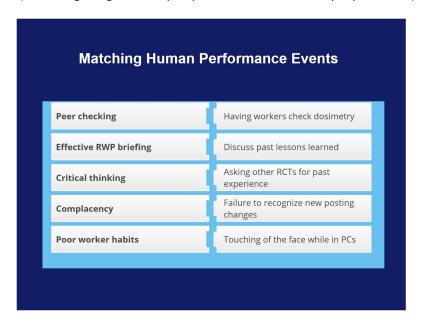


1.41 Insufficient Peer Checking



1.42 Knowledge Check #3

(Matching Drag-and-Drop, 0 points, unlimited attempts permitted)



Correct	Choice
Peer checking	Having workers check dosimetry

Effective RWP briefing	Discuss past lessons learned
Critical thinking	Asking other RCTs for past experience
Complacency	Failure to recognize new posting changes
Poor worker habits	Touching of the face while in PCs

Feedback when correct:

That's right! You matched the correct performance events.

Feedback when incorrect:

You did not select the correct response.

Correct (Slide Layer)



Incorrect (Slide Layer)



Try Again (Slide Layer)



1.43 Preparing for the Job

Preparing for the Job

Prior to the brief, the RCT should plan and prepare for everything they will need to perform the coverage. Walk down the area, if possible, to assess the conditions and better determine any supplies needed. Things to consider include:

- Gathering survey materials (smears, LAS, maps)
 - Confirm power supplies available
- Setting up the work site (lay down area, sticky mats, counting station)
- Engineering controls (HEPA,

Air sampling equipment staged

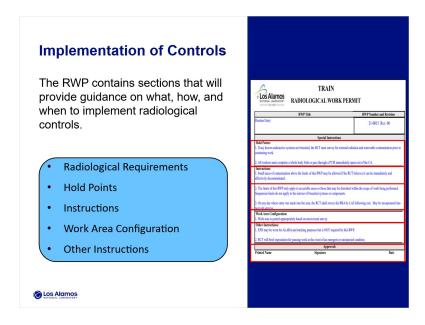
- Ensure instrumentation is checked .
- shielding)
- Dosimetry available (EPDs)
- Verify size of the work area is sufficient to support the job
- Verification of postings in the area PCM/HFM are operable

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1.44 Starting the Job



1.45 Implementaion of Controls



1.46 Radiological Requirements



1.47 Hold Points

Hold Points

Pause points in a work activity where radiological conditions may change and a special or specific action, such as a survey, is required of workers or RCTs. Examples of hold points:

- External survey required upon withdrawal of a source from shielding
- Survey required upon removal of a glove box window or glove from the box structure
- Hold point for RCT to take a sample for HPAL analysis





1.48 Instructions

Instructions

This field includes any specific instructions related to the work activity. Instructions may apply to the entire RWP, or to particular tasks. Types of instructions can be:

- A remote handling tool must be
- Nasal smears are required if unanticipated contamination is found
- Put work in a safe condition and immediately exit the area if a CAM alarms





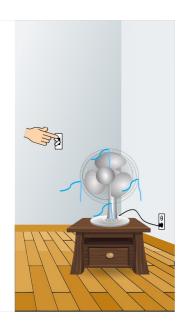
1.49 Work Area Configuration

Work Area Configuration

This field includes required work area controls established to ensure exposures are maintained ALARA. Examples include:

- Securing of ventilation
- Postings such as an HJEA
- · Red-lighting a room
- Barrier placements
- Contamination control measures (e.g, plastic flooring, sticky mats, etc.)





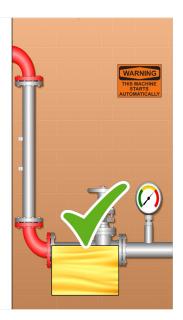
1.50 Other Instructions

Other Instructions

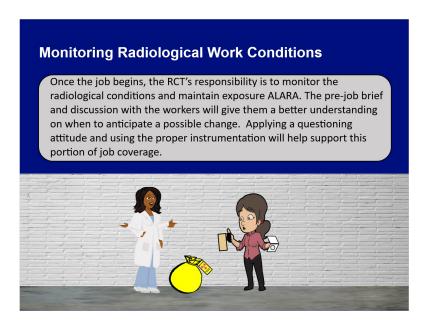
A miscellaneous field for information that does not fall into the categories previously described. Examples for other instructions can be:

- References to work authorizing documents
- Small, localized contamination above the RWP suspension limit is permitted only if the RCT determines the contamination can be immediately decontaminated

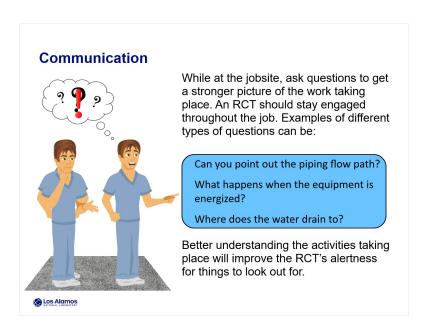




1.51 Monitoring Radiological Work Conditions



1.52 Communication



1.53 Right Tools for the Job

Right Tools for the Job

The correct survey equipment must be used for the job coverage. Failure to monitor a specific type of radiation or contamination can result in posting violations, release of radioactive material to the public, or personnel contamination events. Examples of common instrumentation found at LANL:

Radiation	Instrument	
Gamma/X-ray	RO-20 Micro-Rem Teletector	
Beta	RO-20 (open window)	
Neutron	E-600/NRD RadEye PX/NRD ESP/NRD	

Contamination	Instrument
Alpha	Ludlum 139 w/ 43-32 RadEye PX w/43-32
Beta/Gamma	ESP-1 w/HP-360
Alpha/Beta	RadEye SX w/43-93
Tritium (low energy beta)	Send to HPAL for LSC

1.54 Changes in Dose Rate

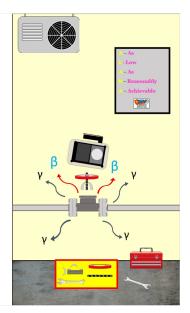
Changes in Dose Rate

The following are examples that have the possibility to change local area dose rates:

- Moving water
- · Removing shielding
- Opening a system exposing beta radiation
- Energizing an RGD
- Exposing a source



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1.55 Changes in Contamination

Changes in Contamination

Examples of actions that may potentially lead to a spread of contamination:

- Glovebox bag out or glove change
- Grinding/Sanding
- Starting/Securing ventilation
- Opening radioactive material
- Releasing items from a CA





1.56 Pause/Stop Work Procedure

Pause/Stop Work Procedure

While a job is being performed, it can be paused or stopped by any worker.

P101-18, *Procedure for Pause/Stop Work* is the LANL policy that states the differences between pausing or stopping work and the conditions for each.

An RCT should closely monitor for any conditions that necessitate a worker initiated pause/stop work, including any RWP requirement violations.





1.57 Pausing Work

Pausing Work

Worker-initiated pause of work is a simple process used to temporarily halt work so that confusions, misunderstandings, work area, work management, authorization, tool, or equipment issues may be resolved prior to proceeding.

A pause is initiated, resolved, and a task re-engaged at the lowest practical level of worker, mentor, supervisor, or manager as the issue indicates.



1.58 Stopping Work

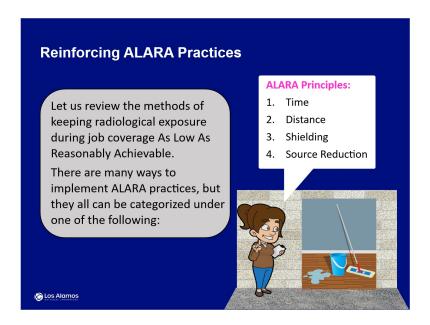
Stopping Work

A stop-work action is a formal suspension of work activities. A stop-work action involves the official stand down of a single task, multiple activities, or operations within a facility or Laboratory program or project to address health, safety, environmental, procedural, security, waste generation noncompliance, and/or quality concerns that pose undue risk or imminent danger to personnel or the facility.

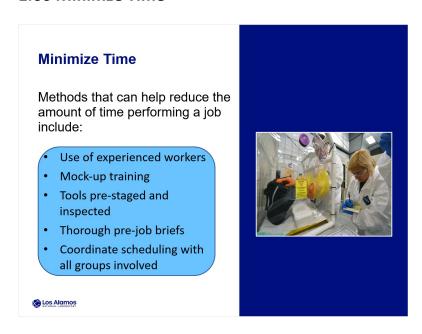
- Condition of imminent danger
 - Inadequate hazard analysis
- Unsafe condition not immediately correctable
- Unplanned hazards have been identified
- Unsafe work method
- Inadequate PPE



1.59 Reinforcing ALARA Practices



1.60 Minimze Time



1.61 Maximize Distance

Maximize Distance

Methods to keep the workers away from radiological sources can be:

- Extended reach tools
- Remote monitoring
- Moving the work location
- Utilize Low Dose Waiting Areas



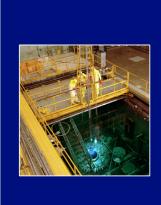


1.62 Maximize Shielding

Maximize Shielding

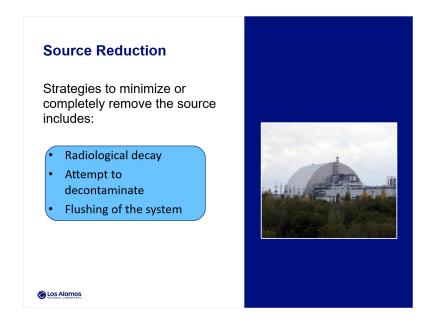
Different forms of shielding that can be used for job coverage are:

- Shield blocks
- Shield caves
- Lead blankets
- Water tanks
- Roll-away shields

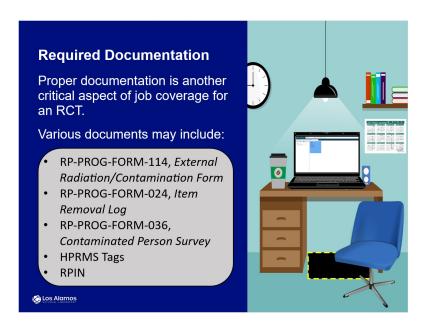


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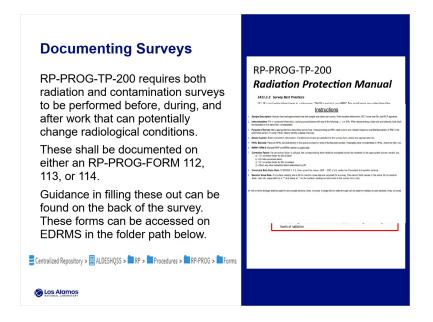
1.63 Source Reduction



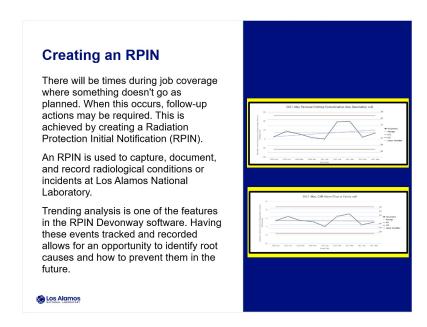
1.64 Required Documentation



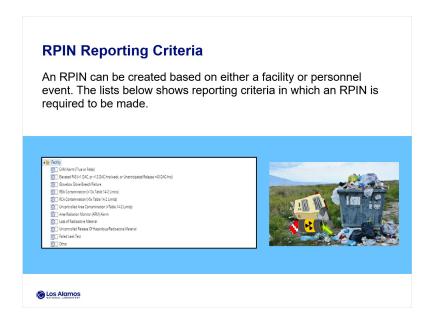
1.65 Documenting Surveys



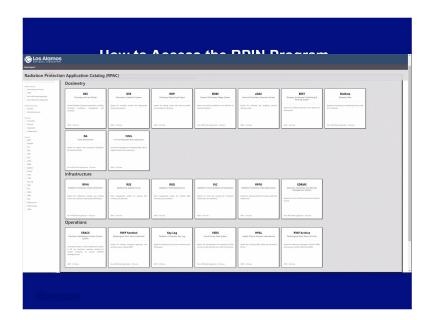
1.66 Creating an RPIN



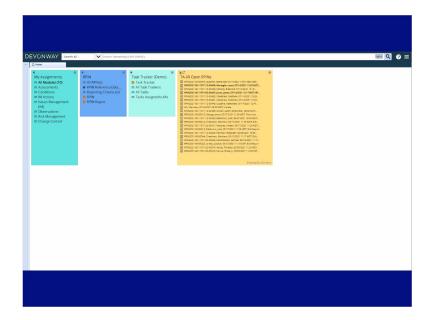
1.67 RPIN Reporting Criteria



1.68 How to Access the RPIN Program



1.69 Initiating an RPIN



Notes:

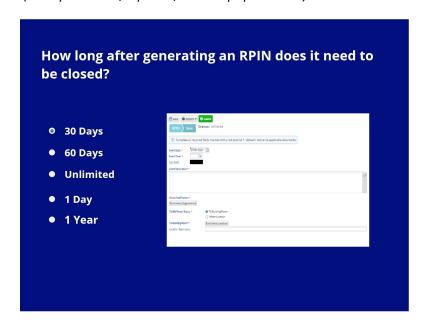
1.70 Editing an RPIN



Notes:

1.71 Knowledge Check #4

(Multiple Choice, 0 points, 1 attempt permitted)



Correct	Choice
Х	30 Days
	60 Days
	Unlimited
	1 Day
	1 Year

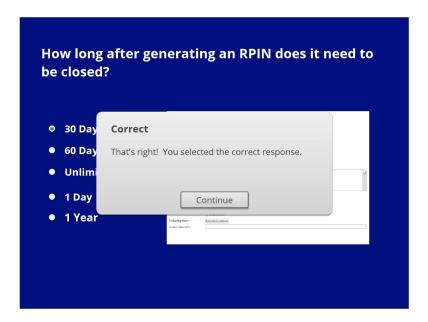
Feedback when correct:

That's right! You selected the correct response.

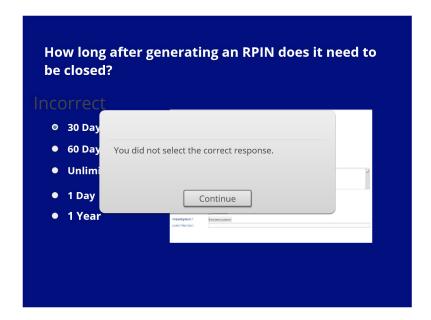
Feedback when incorrect:

You did not select the correct response.

Correct (Slide Layer)

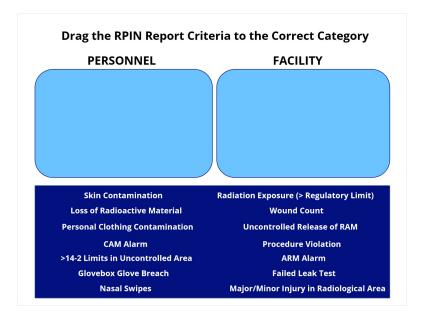


Incorrect (Slide Layer)



1.72 Knowledge Check #5

(Drag and Drop, 10 points, 2 attempts permitted)



Drag Item	Drop Target
Wound Count	Rectangle 2
Nasal Swipes	Rectangle 2
Personal Clothing Contamination	Rectangle 2
Skin Contamination	Rectangle 2
Major/Minor Injury in Radiological Area	Rectangle 2
Failed Leak Test	Rectangle 3
Radiation Exposure (> Regulatory Limit)	Rectangle 2
>14-2 Limits in Uncontrolled Area	Rectangle 3
CAM Alarm	Rectangle 3
Glovebox Glove Breach	Rectangle 3
Loss of Radioactive Material	Rectangle 3

Uncontrolled Release of RAM	Rectangle 3
ARM Alarm	Rectangle 3
Procedure Violation	Rectangle 2

Drag and drop properties

Delay item drop states until interaction is submitted

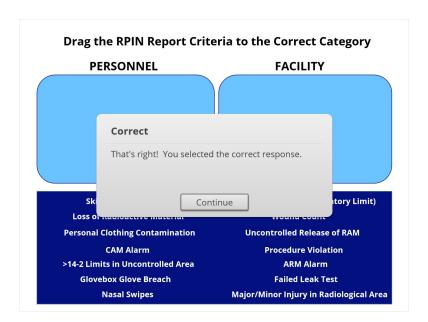
Feedback when correct:

That's right! You selected the correct response.

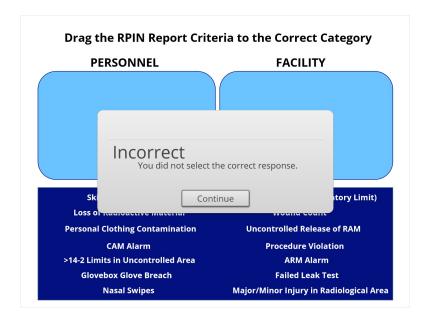
Feedback when incorrect:

You did not select the correct response.

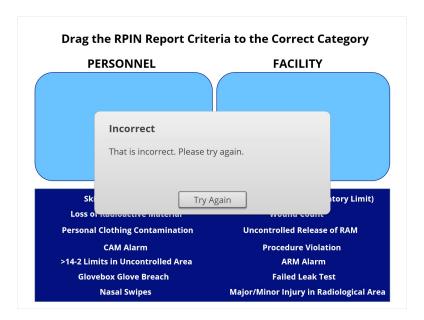
Correct (Slide Layer)



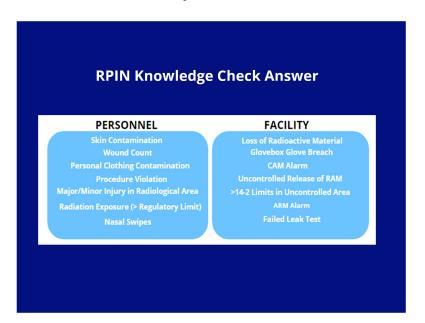
Incorrect (Slide Layer)



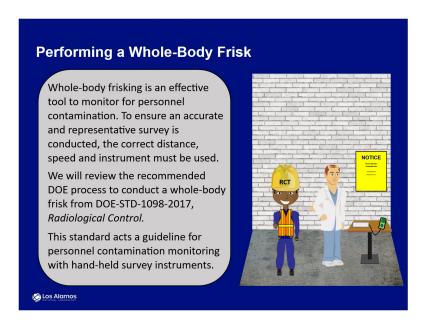
Try Again (Slide Layer)



1.73 KC #5 Answer Key



1.74 Performing a Whole-Body Frisk



Notes:

1.75 Frisking Guidelines

Frisking Guidelines

- ✓ Ensure instrument has been checked for the day and on the proper scale or mode
- ✓ If an audible feature is available, verify it is turned on. Audible responses will occur before seeing the counts displayed on the instrument
- ✓ Probe distance should be 1/4" from surface of object being surveyed
- ✓ Move probe slowly over surface approximately 1 - 2 inches per second
- ✓ If count rate increases during frisking, pause 5 to 10 seconds over area until counts stabilize





1.76 Sequence of Monitoring

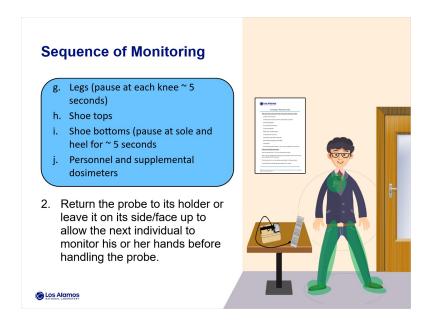
Sequence of Monitoring

- 1. Perform the following in order:
- a. Frisk hands before picking up the probe
- b. Head (pause at mouth and nose ~ 5 seconds)
- c. Neck and shoulders
- d. Arms (pause at each elbow ~ 5 seconds)
- e. Chest and abdomen
- f. Back, hips, and seat of pants

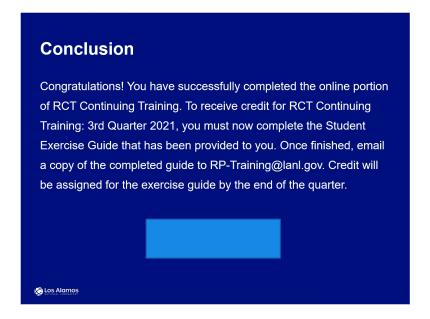




1.77 Sequence of Monitoring Continued



1.78 Conclusion



Notes:

